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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/872,188	06/01/2001	David C. Mullen	7	2918

34847	7590	09/29/2005

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EXAMINER
ALI, SYED J

ART UNIT	PAPER NUMBER
2195	

DATE MAILED: 09/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/872,188	MULLEN, DAVID C.
	Examiner	Art Unit	
	Syed J. Ali	2195	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 July 2005*.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18 and 20-54* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18 and 20-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   This office action is in response to the amendment filed July 11, 2005. Claims 1-18 and

20-54 are presented for examination.

2.   The text of those sections of Title 35, U.S. code not included in this office action can be

found in a prior office action.

Claim Rejections - 35 USC § 103

3.   **Claims 1-13, 15-16, 18, 20-32, 34-35, 37-49, 51-52, and 54 are rejected under 35**

U.S.C. 103(a) as being unpatentable over Kalavade et al. (USPN 6,393,433) (hereinafter

Kalavade).

4.   As per claims 1-10, 16, 18, 20-29, 35, 37-46, 52, and 54, Kalavade teaches the invention

as claimed, including a work-management method in a call center comprising determining a

probability of availability at a future point in time of each of a plurality of resources (col. 2 lines

1-20; col. 8 line 57 - col. 9 line 11; col. 10 lines 53-62) by determining an amount of time t that

the resource has been servicing a task by now (col. 6 lines 15-31; col. 7 lines 19-37), wherein the

tasks comprise calls (col. 3 lines 32-62);

for each of the resources, determining a probability $F(t + h)$ of the resource servicing its

task to completion within a total amount of time $t + h$, where h is an amount of time (col. 9 lines

60-67);

for each of the resources, determining a probability $F(t)$ of the resource completing servicing its task by now (col. 10 lines 1-20);

for each of the resources, determining a probability P that the resource will complete servicing its task at the future point in time the amount of time h from now as $F(t + h) - F(t) / 1 - F(t)$ (col. 9 line 33 - col. 10 line 24);

combining the probabilities by summing the probabilities to obtain a number (col. 4 lines 40-47); and

using the number to schedule no more than the number of new tasks to become available for servicing by the plurality of the resources (col. 9 lines 5-11) for the resources for the future point in time (col. 4 lines 40-47; col. 4 line 65 - col. 5 line 1) by determining whether or not to initiate or cancel an outbound call in response to P (col. 3 lines 56-62; col. 10 line 53 - col. 11 line 12).

5.   There are some noted differences between the precise claim language and the disclosure of Kalavade. For example, the claim recites computing a probability that a plurality of resources will be available in the future, while Kalavade discusses computing the probability of a task completing before its deadline expires. Essentially, the calculation of whether a task will complete before a particular deadline can be considered in similar terms as the task yielding the resource at particular point in time.

The probability that the task will complete is the same as the probability of the resource being available, as the resource is only occupied as long as a task executes. Kalavade uses the statistical analysis as an admission control technique, only allowing tasks to be scheduled if the task's probable completion time satisfies the scheduling policy. It would have been obvious to one of ordinary skill in the art that by computing the probability of a task completing by its deadline, the scheduler knows with greater certainty whether another task with a hard deadline can reasonably be scheduled on that resource.

6.   As per claims 11-13, 15, 30-32, 34, 47-49, and 51, Kalavade teaches the invention as claimed, including obtaining historical task-completion statistics comprising a mean and a variance of time historically spent by resources on servicing tasks to completion (col. 4 lines 20-31); and

from the obtained statistics determining the probability $F(t + h)$ and $F(t)$ (col. 7 lines 19-37; col. 9 line 33 - col. 10 line 24) by fitting the task-completion statistics into a lifetime closed-form cumulative-probability distribution to determine the parameters of the distribution (col. 5 lines 36-65), and

evaluating the distribution with the determined parameters and the total amount of time t + h to obtain $F(t + h)$ and the amount of time t to obtain $F(t)$ (col. 7 lines 19-53), wherein determining the amount of time t and the historical task-completion statistics is for one of a plurality of types of tasks (col. 4 lines 14-39).

7.   Claims 14, 17, 33, 36, 50, and 53 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Kalavade in view of Pena-Nieves et al. (USPN 6,816,798) (hereinafter

Pena-Nieves).

8.   As per claims 14 and 17, Pena-Nieves teaches the invention as claimed, including

representing the historical task-completion statistics as a Weibull distribution (col. 5 lines 24-26)

using dispersion and central tendency parameters (col. 5 lines 27-43) in the form of a histogram

(col. 4 lines 22-33).

9.   It would have been obvious to one of ordinary skill in the art to combine Kalavade with

Pena-Nieves since Weibull distributions have a great deal of flexibility for determining

probabilities and can assume various distribution profiles (Pena-Nieves, col. 5 line 24-26). Many

functions and applications are developed for mathematical analysis using Weibull distributions,

making it a logical choice for statistical analysis and applications.

Response to Arguments

10.   Applicant's arguments, see pgs. 16-17 of Applicant's remarks, filed July 11, 2005,

with respect to the rejection under 35 U.S.C. § 101 have been fully considered and are

persuasive. The rejection has been withdrawn.

11.   Applicant's arguments filed July 11, 2005 with respect to the rejections under 35

U.S.C. § 103 have been fully considered but they are not persuasive.

12.   Applicant argues on page 18 of the remarks that Kalavade is deficient, as the reference

allegedly does not *"use the probability that a task completes before its deadline as an admission*

policy for scheduling tasks."   Applicant adds, *"[t]he scheduling of new tasks is not based on*

task-completion probabilities, but an actual task completion.   Kalavade...only use[s] the

probability that a task completes its execution by its deadline to evaluate the performance of

different scheduling policies."   A similar argument is presented on page 19 of Applicant's

remarks.

13.   Applicant overlooks the uses Kalavade presents for the computed probabilities. Although

it is noted that Kalavade stops short of discussing scheduling issues at great length, as the

invention is more concerned with a method of accurately predicting whether a task will be able

to complete within its deadline given the scheduling policy. However, to say that Kalavade does

not contemplate using these probabilities to improve scheduling or as an admission control is

simply untrue. Kalavade discusses several possible uses of the probability calculation, including

ensuring that applications receive a desired quality of service (col. 2 lines 20-23, "performance

metrics may be used to influence the behavior of the run-time scheduler...to ensure that all

applications get their due share of the end-system resource"), to improve load-balancing and

processing efficiency (col. 4 lines 31-39, "result[s] may indicate that a higher quality application

may be satisfactorily sustained...on the same end-system), or as an admission control policy

(col. 4 line 40 - col. 5 line 6, "In yet another example illustrating the utility of such a distribution

of processing delay,...consider admission control techniques", "the application set is infeasible

under hard deadlines").   Thus, Kalavade discusses several ways to use the probability

distribution as aiding in coming up with a scheduling policy.

While Kalavade leaves many of the particulars of the scheduling policy up to the designer

of the end-system, it should be noted that using statistical data or probabilities to determine

resource availability is a well known feature of the prior art (Phaal, USPN 6,006,269 at col. 6

lines 31-33, "the scheduler can compile statistics based on day-to-day operation of the server and

times when the processing resources of the server tend to be less strained; Kauhanen et al. USPN

6,799,042 at col. 3 lines 24-35, "The determination of the probability of enough resources

becoming available is advantageously based on the current situation which at some probability

will remain unchanged until the bearer allocation is done. The latter probability is dependent on

many factors, for example on parameters used in the resource handling/admission control entity.

Values for the latter probability in different traffic conditions may be found for example by

compiling statistics of actual resource behavior"; Vin et al. "A Statistical Admission Control

Algorithm for Multimedia Servers").

14.   Applicant argues, *"the claimed invention computes the probabilities of multiple resources

being available at the same one future point. In contrast, Kalavade et al. compute the

probability...at that task's own deadline, not at a common future point in time."*

15.   The claims, as presently worded, do not support Applicant's argument. The claims

merely recite determining the probability that resources will be available at some future point in

time and using this probability to schedule tasks. There is no limitation that would preclude the

"future point in time" from being a task's deadline. The probability that resources are available

at a future point in time could be read as requiring those resources be free at the beginning of a

task's scheduled execution or that the current task has finished execution by that point in time.

Arguably, these interpretations cover the same subject matter, as a resource will be unavailable at the future point in time if the current task has not completed. Applicant's claims are written broadly, and they are therefore given their broadest possible interpretation.

Conclusion

16.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
September 26, 2005

MENG-AI T. AN
SUPERVISORY PATENT EXAMINER
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